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- (71) Applicant (*for all designated States except US*): TELEFONAKTIEBOLAGET L M ERICSSON (PUBL) [SE/SE]; S-126 25 Stockholm (SE).
- (72) Inventor; and
- (75) Inventor/Applicant (*for US only*): UNRUH, Erland [SE/SE]; Limhammsvägen 6b, S-217 59 Malmö (SE).
- (74) Agent: ERICSSON MOBILE PLATFORMS AB; S-221 83 Lund (SE).
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(54) Title: METHOD AND APPARATUS FOR PRODUCING PICTURES WITHIN A TEXT DISPLAY OF A MOBILE DEVICE

(57) Abstract: A mobile device for displaying pictures on a display. The mobile device includes at least one application for generating a bitmap image of the picture and a display for displaying the picture. The bitmap image is provided to a font system which stores the bitmap image of the picture with an associated character value. The bitmap image may be retrieved by providing the character value to the font system and using the bitmap image to generate the picture on the display.

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METHOD AND APPARATUS FOR PRODUCING PICTURES WITHIN A
TEXT DISPLAY OF A MOBILE DEVICE

BACKGROUND OF THE INVENTION

Technical Field of the Invention

5 The present invention relates generally to mobile device displays, and more particularly, to the display of pictures with text within a mobile device display.

Description of Related Art

10 As the use of mobile devices becomes more prevalent within the marketplace, the various functionalities offered by mobile devices have greatly expanded. The display of e-mail messages and surfing the Internet using WAP protocols are only some of the applications that are now being performed by mobile devices. As the number of 15 applications and uses for mobile devices increases, the requirements desired from the display of the mobile terminal have increased accordingly.

20 Wherein previously only the display of simple text messages was required by the displays of mobile devices, increased uses of services such as e-mail and web-browsing have created a need for the mobile device display to provide both text and pictorial information upon the display. This creates quite a problem due to the complexity inherent in the general nature of display 25 of text with pictures or pictures alone. This arises in large part from the limited resources available in a mobile device with respect to memory and CPU computing power. Therefore, a need exists for a manner to more efficiently display pictures within the display of a 30 mobile device.

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SUMMARY OF THE INVENTION

The present invention overcomes the foregoing and other problems with a mobile device capable of displaying a picture along with text on the display of the mobile device. At least one application within the mobile device can generate a bitmap image of a picture which is desired to be displayed at some point. This bitmap image is provided to a font system within the mobile device which stores the bitmap image of the picture within a font storage area and associates a selected character value with the stored bitmap image. The bitmap image may be retrieved from the font storage area responsive to provision of the associated character value to the font system. The retrieved bitmap image may be then used to generate the picture upon the display of the mobile device.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the method and apparatus of the present invention may be obtained by reference to the following Detailed Description when taken in conjunction with the accompanying Drawings wherein:

FIGURE 1 is a block diagram illustrating a mobile device configured to display both pictures and text upon the display of the mobile device according to the present invention;

FIGURE 2 is a functional block diagram of the system for displaying pictures within the mobile device;

FIGURE 3 illustrates the process of the present invention; and

FIGURE 4 is a flow diagram illustrating the process performed by the system of FIGURE 2.

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DETAILED DESCRIPTION

Referring now to the drawings, and more particular to FIGURE 1, there is illustrated a mobile device 10 implementing the functionality necessary to display pictures within a display 15 of the mobile device 10. The mobile device 10 may comprise a mobile telephone, laptop computer, PDA, pager, or any other mobile electronic device having a display. Applications 20 within the mobile device 10 include picture generation functionalities 25 providing the ability to generate bitmap images of pictures and modify fonts within the font system 30 of the mobile device in run time. Alternatively, the bitmap images could be directly input to mobile terminal via an external port (not shown), or downloaded from an external network such as the Internet. A bitmap defines a display space and the color for each pixel or "bit" in the display space. GIF and a JPEG are examples of graphic image file types that contain bitmaps. A bitmap does not need to contain a bit of color-coded information for each pixel on every row. It only needs to contain information indicating a new color as the display scans along a row. Thus, an image with much solid color will tend to require a small bit map.

The font system 30 includes a font manager 35, font handler 40 and font storage area 45. The font manager 35 receives instructions from the picture generating functionality 25 in order to store a bitmap of a provided picture. Within existing mobile devices, most font systems 30 include a number of fonts which are stored within the font storage area 45. Each character of a font is individually stored within the font storage area 45. Each of these stored characters comprises a stored bitmap image of the character. Within the present

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invention, the font manager 35 receives a provided bitmap from the picture generating functionality 25 and stores this provided bitmap within the font storage area 45. The stored bitmap 50 of the picture is referred to as a virtual font. The stored bitmap 50 for the picture has a character value associated therewith by the font manager 35.

One example of a system for identifying font characters is the Unicode system. The Unicode standard is the universal character and coding standard used for the recordation of text for computer processing. The Unicode system provides a format wherein a unique number is associated with every character of virtually any language. The standard uses a default 16 bit encoding that provides code points for more than 65,000 characters. The Unicode standards also provides for an extension mechanism that enables encoding for as many as one million additional characters without the use of complex modes or escape codes. The standard also reserves the 6,400 code values for private use in the normal format and 131,068 code values for private use within the extended coding scheme. These areas reserved for private use might be utilized for storing codes for bitmap images of pictures rather than for characters according to the present invention.

The character values provided by the font manager 35 may utilize the full range of characters in the font (for Unicode this range is roughly 0-65535) or use a restricted code range within a "private area". The advantage of using a private area is that text handling routines implemented within the font manager 35 normally have different code ranges categorized with characters having characteristics that a picture would not have. By

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selecting a private area for designation of the picture fonts, the private area may be free of any undesired characteristics.

By providing the associated character value, the picture stored within the font storage area 45 may be retrieved by the font handler 40 and provided to the display control 55 for generation of the picture on the display 15. The font handler 40 retrieves the required fonts from font storage area 45 and provides them to the display 55. The font handler 40 must have the capability to handle different sized characters (width, height, proportional text). The font handler 40 accesses the stored bitmaps 50 of the pictures within the font storage area 45 responsive to the character values described previously.

Referring now to FIGURE 2, wherein there is provided an illustration of the functional operation of the present invention with the mobile device. The application 20 within the mobile device 10 can either store or remove pictures from the font storage area 45 (FIGURE 1) by accessing the font manager 35. The font manager 35 stores the bitmap images for the virtual font 50 along with other fonts 65 for normal text characters within the font storage area 45.

The applications 20 may request the display of the stored virtual font 50 by accessing the text handling routines 70. The text handling routines 70 process the various character values provided by the applications 20 and forward these to the layout routine 75. The layout routine 75 accesses the font handler 40 to request that the particular font identified by the character value be provided to the layout routine 75. The layout routine 75 will also configure the width and height of the desired

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font. The layout routine 75 provides the layout (i.e., orientation, spacing, etc.) for the indicated text and/or pictures and provides these to the drawing routine 80. The drawing routine 80 uses the information from the layout routine 75 and the received bitmap images of the requested fonts from the font handler 40 to draw the text and/or pictures requested by the applications 20. The drawing routine 80 forwards the rendered information to the display 15 to be displayed to a user. Likewise, the application 20 may request removal of a font 50. In this case the request for removal is merely forwarded to the font handler and the font manager 35 removes the bitmap from the font storage area 45.

Referring now to FIGURE 3, there is provided a general illustration of the above described process. A picture 80 of an apple is provided from the applications 20 to the virtual font manager 35 which stores this information within the font storage area 45. The character value of "32" is associated with the picture of the apple. The applications 20 next requests display of the apple picture 80 by providing the character value "32" to the font handler 40 and the font handler 40 provides the bitmap image of the stored apple which may then be displayed on display screen 15.

Referring now to FIGURE 4, there is illustrated a flow diagram of the process of the present invention. Mobile device application 20 provides at step 90 a bitmap picture to the font manager 35. The font manager 35 stores at step 95 the provided picture as a virtual font character 50 within the font storage area 45. The font manager 35 also associates at step 100 a particular character value with the stored bitmap picture so that the bitmap picture may be recalled at a later time. The

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virtual font manager 35 notifies the applications at 105 of the generated character value so that they may access the stored bitmap at a later time. The applications 20 provide at step 110 the character value associated with the bitmap picture in order to request its display. Responsive to the provided character value, the bitmap for the indicated virtual font 50 is retrieved by the font handler 40 from the font storage area 45 at step 115 and is provided to the display 15 such that the picture can be generated at step 120.

Using the above described system and method, pictures may be displayed utilizing already existing text handling routines within the mobile device. The pictures are able to enter the text handling function disguised as normal characters such that the system works no differently than when displaying normal text. Likewise, the pictures will automatically end up mixed with text since the picture is merely displayed as another character.

The previous description is of a preferred embodiment for implementing the invention, and the scope of the invention should not necessarily be limited by this description. The scope of the present invention is instead defined by the following claims.

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WHAT IS CLAIMED IS:

1. A method for generating pictures on a display a
mobile device comprising the steps of:

5 storing a bitmap image of a picture at a first
storage location;

associating a character value with the stored bitmap
image;

10 retrieving the stored bitmap image of the picture
using the character value; and

15 generating the picture on the display of the mobile
device using the retrieved bitmap image.

2. The method of Claim 1, further comprising the
steps of:

15 generating the bitmap image within an application of
the mobile device; and

forwarding the generated bitmap image to a font
manager.

20 3. The method of Claim 1, further comprising the
steps of:

generating a request for removal of the stored
bitmap image of the picture; and

25 removing the stored bitmap image of the picture from
the first storage area.

30 4. The method of Claim 1, wherein the step of
storing further comprises the step of storing the bitmap
image of a picture at a text font storage area.

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5. The method of Claim 1, wherein the step of retrieving further comprises the step of providing the character value from an application within the mobile device to a font handling routine.

5

6. The method of Claim 1, wherein the character value comprises a character value associated with a font.

10

7. The method of Claim 1, further comprising the steps of displaying text along with the picture.

8. The method of Claim 7, wherein the step of displaying further comprises the step of:

15 providing at least one second character value associated with a text character;

retrieving the text character responsive to the at least one second character value; and

generating the text character on the display.

20

9. The method of Claim 1, wherein the mobile device comprises a mobile telephone.

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10. A method for generating pictures on a display a mobile device comprising the steps of:
generating the bitmap image within an application of the mobile device; and
5 forwarding the generated bitmap image to a font manager;
storing the bitmap image of a picture at a text font storage area;
10 associating a character value with the stored bitmap image;
providing the character value from an application within the mobile device to a font handling routine;
retrieving the stored bitmap image of the picture using the provided character value; and
15 generating the picture on the display of the mobile device using the retrieved bitmap image.

11. The method of Claim 10, further comprising the steps of:

- 20 generating a request for removal of the stored bitmap image of the picture; and
removing the stored bitmap image of the picture from the first storage area.

25 12. The method of Claim 11, wherein the character value comprises a character value associated with a font.

13. The method of Claim 11, further comprising the steps of displaying text along with the picture.

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14. The method of Claim 11, wherein the step of displaying further comprises the step of:

providing at least one second character value associated with a text character;

5 retrieving the text character responsive to the at least one second character value; and
generating the text character on the display.

10 15. The method of Claim 10, wherein the mobile device comprises a mobile telephone.

16. A mobile device capable of displaying a picture on a display, comprising:

15 at least one application for generating a bitmap image of the picture;

a display for displaying the bitmap image of the picture; and

20 a font system for storing the bitmap image of the picture and associating a character value therewith and for providing the bitmap image to the display responsive to the character value.

25 17. The mobile device of Claim 14, wherein the font system further comprises:

a font storage area for storing the bitmap image of the picture;

a font manager for associating the character value with the stored bitmap image; and

30 a font handler for retrieving the bitmap image from the font storage area responsive to the character value.

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18. The mobile device of Claim 15, wherein the font handler further retrieves a second bitmap image associated with a text character from the font storage area responsive to a second character value.

5

19. The mobile device of Claim 14, further including at least one application for generating a request to remove the stored bitmap image.

10

20. The mobile device of Claim 14, wherein the font system removes the bitmap image responsive to the request to remove.

15

21. The mobile device of Claim 14, wherein the font system further stores bitmap images of text characters and associates character values therewith.

20

22. The mobile device of Claim 14, wherein the character value comprises a character value normally associated with a text font.

23. The mobile device of Claim 14, wherein the mobile devise comprises a mobile telephone.

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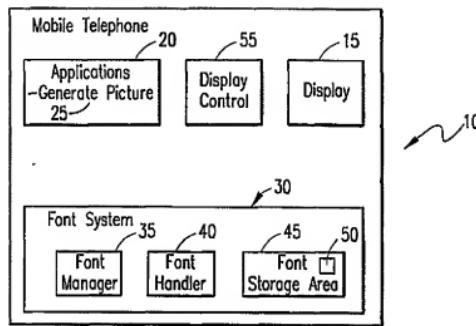


FIG. 1

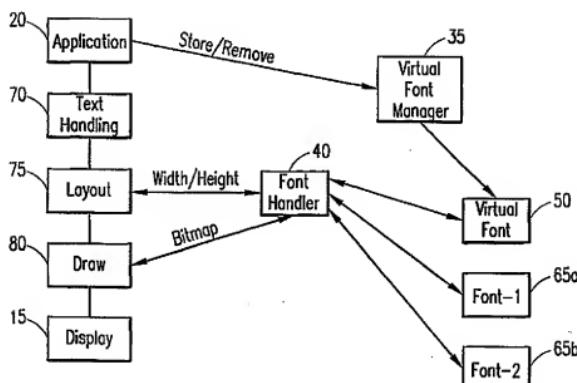


FIG. 2

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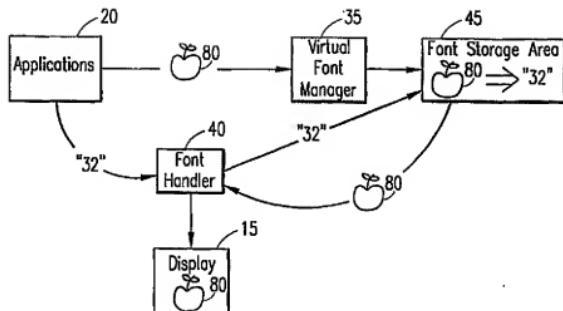


FIG. 3

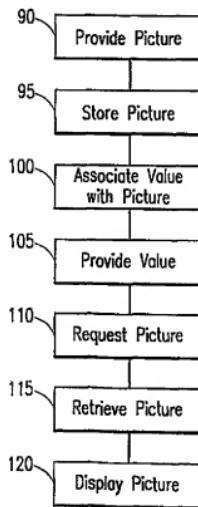


FIG. 4